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SPECIFIC PRECIPITINS IN GONOCOCCAL INFECTIONS

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Since the discovery by Kraus,¹ in 1897, of specific precipitins in anticholera and other immune serum, and of Bordet² and Tchistowitch,³ in 1899, of specific precipitins in the serums of animals injected with foreign proteins, the study of specific precipitation has been pursued extensively. Bruckner and Cristeanu⁴ were the first to study precipitins in gonococcal infection, in 1906.

Gonococci grown on blood agar were treated with 0.15% caustic soda, filtered through porcelain, and mixed with antigenococcus serum, in which a marked precipitate was found whereas there was no precipitate in mixtures with normal serum.

Wollstein⁵ obtained precipitate with antigenococcus rabbit serum and various forms of extracts of gonococci.

Torrey,⁶ using a culture filtrate, obtained marked precipitate with immune rabbit serum, but only a slight reaction with the serum of animals injected with meningococcus, the micrococcus catarrhalis, and none at all with antistaphylococcus serum. He also observed that stronger reactions were obtained with the homologous than the heterologous strains, and this led him to suggest that there may be different types of gonococci, especially as experiments with other immunity reactions indicated that such would be the case.

I have studied the questions of precipitins in gonococcal infection, and in antigenococcus serum, also whether precipitation will distinguish between the gonococcus and the meningococcus, and whether it will permit the grouping of gonococci.

EXPERIMENTS

Eight strains of gonococci were used, the same as I used in my study⁷ of complement fixation and of carbohydrate reactions.

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¹ Wien. klin. Wchnschr., No. 32, 1897.

² Ann. de l'Inst. Pasteur, 1899, 13, p. 179.

³ Ibid., p. 406.

⁴ Compt. rend. Soc. de biol., 1906, 9, p. 846.

⁵ Jour. Exp. Med., 1907, 16, p. 329.

⁶ Jour. Med. Research, 1907, 16, p. 329.

⁷ Jour. Infect Dis., 1910, 7, p. 159.

It is essential that the antigen, that is, the culture filtrate, should not contain the slightest amount of serum of any kind. I have used Thallmann's broth in which gonococci were allowed to grow for 4 weeks at 37 C. and then removed by centrifugation at 2000 revolutions a minute. Carbolic acid was added to the supernatant fluid in the proportion of 0.5%.

The serum of various patients has been used. Antigonococcus serum was obtained from rabbits injected with gonococci grown for from 24 to 48 hours on horse blood agar. Carbolic acid, 0.5%, was added as a preservative.

The serum of healthy persons, of normal rabbits, of patients with other diseases than gonorrhea, and other immune serums were used also, as well as antigens prepared with the meningococcus, the micrococcus catarrhalis, the staphylococcus, and the colon bacillus.

In making the tests the serum is diluted and thoroughly mixed with the antigen, the mixture being left at room temperature for 24 hours.

Experiments with the serum of 6 healthy young men who never had had gonorrhea gave absolutely negative results with all the antigens except, in one case, a slight precipitate formed in the mixtures with the staphylococcus and colon bacillus antigen.

TABLE 1
CROSS PRECIPITIN REACTIONS WITH THE SERUM OF RABBITS INJECTED WITH GONOCOCCI

Immune Rabbit Serum	Gonococcal Strains *							
	A	B	C	D	E	F	G	H
A	200	200	100	50	200	50	100	200
B	200	200	200	100	200	50	200	200
C	200	200	200	50	200	50	200	200
D	50	50	100	200	500	200	50	50
E	200	200	200	50	200	200	200	200
F	100	100	100	200	200	200	50	50
G	100	100	100	50	100	50	100	100
H	200	200	100	50	200	50	200	200

* The figures give the highest dilution of the serum in which distinct precipitation took place.

In 2 cases of acute gonorrheal urethritis in men the result was negative. In the case of a man, 28 years old, who had chronic gonorrheal urethritis since he was 18, a precipitate was obtained with the antigens of all the 8 strains of gonococci in a dilution of the serum of 1:10, and with 5 of the antigens in a dilution of the serum of 1:50.

In another case of chronic and recurrent urethritis in a man 38 years old, 6 strains reacted with the serum in a dilution of 1:100. There was a slight precipitate with the meningococcus antigen at a serum dilution of 1:10.

In 2 cases of chronic gonorrheal urethritis the reaction was wholly negative. The serum of a woman with chronic gonorrheal endometritis gave precipitate with all the gonococcal antigens to the same degree, dilution of 1:25, but in 2 other women there was no precipitate.

In the case of a man, aged 35, the subject of chronic urethritis and gonococcal arthritis, the serum reacted with all 8 antigens but most markedly with the same 6 as previously noted.

In the case of 2 patients who had had gonorrhea some years previously followed by complete cure, the results of precipitin tests were negative.

In the case of 3 patients with other diseases than gonorrhea and without any history of having had gonorrhea the precipitin tests were also negative.

The results of these observations show that specific precipitins may develop in the course of chronic gonococcal infections, but not regularly; in these cases the reaction may not be equally well marked with different antigens, but the difference is only a quantitative one. Occasionally human serum contains a small amount of precipitin for meningococci.

The serum of healthy rabbits does not contain any gonococcal precipitin.

The serum of rabbits immunized with the 8 different strains of gonococci used in these experiments gave reactions as shown in Table 1. These are the serums that I used in my complement fixation tests.⁷ As shown by this table the 8 strains of gonococci appear to fall in 2 groups, but the difference between the 2 groups is merely a quantitative one, as no strain was found to be wholly refractory. Strains D and F were precipitated by all the serums in dilutions of at least 1:50, and Serum D and F caused precipitates with all the strains of gonococci.

In no case did any of the antigonococcus serums form precipitates in control tubes with salt solution or with extracts of the meningococcus, *M. catarrhalis*, the staphylococcus or the colon bacillus. The serum of rabbits injected with the meningococcus, *M. catarrhalis* or with the colon bacillus also gave only strictly specific reactions; serum of horses injected with typhoid or dysentery bacilli, or the serum of an ox injected with dysentery bacilli gave no precipitates with gonococcal extracts. Normal horse, ox, goat, and dog serums were also without action. In the mixtures of gonococcal extract and antigonococcus serum the precipitates form slowly, requiring about 5 hours at room temperature before any cloudiness could be detected even in the stronger serum mixtures.

SUMMARY

Normal serums, human, rabbit, horse, ox, goat, dog, as a rule, do not contain precipitins for gonococcal protein.

The serum of patients with gonococcal infection may contain specific gonococcal precipitates, but this seems to be the case when the infection has been severe and has lasted for some time. The serum of patients with typhoid fever or other infections, not gonococcal, does not contain gonococcal precipitin.

The serum of rabbits injected with 8 strains of gonococci contained precipitin each one for all the different gonococci, but in the case of 2 strains the extract gave precipitates in lower dilutions with the serum of the other 6 rabbits than with homologous serum and their serum gave precipitates with the other 6 extracts in lower dilutions than the homologous extract. The serum of rabbits injected with the meningococcus, *M. catarrhalis* and the colon bacillus gave no precipitates with gonococcal extracts.

Apparently antigonococcus serum is not as rich in specific precipitin as in agglutinins and complement-fixing bodies, but the precipitin reaction distinguishes more definitely between gonococci and meningococci, as well as *M. catarrhalis*, than complement fixation.